Mr. Newton's *Letter to the Publiſher of March* 26. 1672. *containing ſome more ſuggeſtions about his New Teleſcope, and a* Table *of* Apertures *and* Charges *for the ſeveral* Lengths *of that Inſtrument.*

SIR,

Since my laſt Letter I have further compared the two Teleſcopes, and find that of Metal to repreſent as well the Moon, as neerer Objects, ſomething diſtincter than the other. But I muſt tell you alſo, that I am not very well aſſured of the goodneſs of that other, which I borrowed to make the Compariſon; and therefore deſire, that the other Experiment ſhould be rather confided in, of reading at the diſtance of between a 100 and 120 foot, at which I and others could read with it in the *Tranſactions*, as I found by meaſure: At which time the aperture was 1$\frac{1}{3}$ of an Inch; which I knew by trying, that an obſtacle of that breadth was requiſite to intercept all the light, which came from one point of the object.

I ſhould tell you alſo, that the little plain piece of metall, next the eye-glaſs, is not truly figured: whereby it happens, that objects are not ſo diſtinct at the middle as at the edges. And I hope, that by correcting its figure, (in which I find more difficulty than one would expect,) they will appear all over diſtinct, and diſtincter in the middle than at the edges. And I doubt not but that the performances will then be greater.

But yet I find, that there is more light loſt by reflection of the metall which I have hitherto uſed, than by tranſmiſſion through glaſſes: for which reaſon a ſhallower charge would probably do better for obſcure objects; ſuppoſe ſuch an one, as would make it magnifie 34 or 32 times. But for bright objects at any diſtance, it ſeems capable of magnifying 38 or 40 times with ſufficient diſtinctneſs. And for all objects, the ſame Charge, I believe, may with advantage be allowed, if the ſteely matter, imployed at *London*, be more ſtrongly reflective than this which I have uſed.

The performances of one of theſe Inſtruments of any length being known, it will appear by this following *Table*, what may

be

be expected from thoſe of other Lengths by this way, if Art can accompliſh what is promiſed by the Theory. In the *firſt* Column is expreſſed the Length of the Teleſcope in feet; which doubled gives the ſemidiameter of the Sphere, on which the concave metall is to be ground. In the *ſecond* column are the proportions of the Apertures for thoſe ſeveral Lengths. And in the *third* column are the Proportions of the *Charges*, or diameter of the ſpheres, on which the convex ſuperficies of the eye-glaſſes are to be ground.

Lengths.	*Apertures.*	*Charges.*
½	100	100
1	168	119
2	283	141
3	383	157
4	476	168
5	562	178
6	645	186
8	800	200
10	946	211
12	1084	221
16	1345	238
20	1591	254
24	1824	263

The uſe of this Table will beſt appear by example: Suppoſe therefore a half foot Teleſcope may diſtinctly magnifie 30 times with an inch Aperture, and it being required to know, what ought to be the analogous conſtitution and performance of a four foot Teleſcope: By the ſecond column, as 100 to 476; ſo are the Apertures, as alſo the number of times which they magnifie. And conſequently ſince the half foot Tube hath an inch aperture and magnifieth 30 times; a four foot Tube proportionally ſhould have $4\frac{76}{100}$ inches aperture, and magnifie 143 times. And by the third column, as 100 to 168; ſo are their Charges: And therefore if the diameter of the convexity of the eye-glaſs for a half foot Teleſcope be $\frac{1}{5}$ of an inch, that for a four foot ſhould be $\frac{168}{500}$, that is, about $\frac{1}{3}$ of an inch.

In like manner, if a half foot Teleſcope may diſtinctly magnifie 36 times with $1\frac{1}{4}$ of an Inch Aperture; a four foot Teleſcope ſhould with equal diſtinctneſs magnifie 171 times with 6 inches Aperture; and one of ſix foot ſhould magnifie 232 times with $8\frac{2}{3}$ inches Aperture; and ſo of other lengths. But what the event will really be, we muſt wait to ſee determined by experience. Only this I thought fit to inſinuate, that they which intend to make trials in other lengths, may more readily know how to deſign their Inſtruments. Thus for a four foot Tube, ſince the Aperture ſhould be 5 or 6 inches, there will be required a piece of metal 7 or 8 inches broad at leaſt, becauſe the figure will ſcarcely be true to the edges. And the thickneſs of the metal muſt be proportional to the breadth, leaſt it bend in the grinding. The metalls being poliſhed, there may be tryals made with ſeveral eye-glaſſes, to find, what Charge may with beſt advantage be made uſe of.

An Extract of another Letter of the ſame to the Publiſher, dated March 30. 1672. *by way of Anſwer to ſome Objections, made by an Ingenious French Philoſopher to the New Reflecting Teleſcope.*

SIR,

I Doubt not but *M. A.* will allow the advantage of reflexion in the Theory to be very great, when he ſhall have informed himſelf of the different *Refrangibility* of the ſeveral rays of light. And for the practique part, it is in ſome meaſure manifeſt by the Inſtruments already made, to what degree of vivacity and brightneſs a metaline ſubſtance may be poliſhed. Nor is it improbable but that there may be new ways of poliſhing found out for metal, which will far excell thoſe that are yet in uſe. And when a metal is once well poliſhed, it will be a long while preſerved from tarniſhing, if diligence be uſed to keep it dry and cloſe, ſhut up from Air: For the principal cauſe of tarniſhing ſeems to be, the condenſing of moiſture on its poliſhed ſurface, which by an Acid ſpirit, where-